ALASKA STATE LEGISLATURE
HOUSE SPECIAL COMMITTEE ON ENERGY
February 27, 2013
8:05 a.m.

MEMBERS PRESENT

Representative Doug Isaacson, Co-Chair
Representative Charisse Millett, Co-Chair
Representative Neal Foster
Representative Pete Higgins
Representative Shelley Hughes
Representative Benjamin Nageak

MEMBERS ABSENT

Representative Andy Josephson

OTHER LEGISLATORS PRESENT

Representative Lance Pruitt

COMMITTEE CALENDAR

PRESENTATION(S): THE ALL ALASKA ENERGY SOLUTION

- HEARD

PRESENTATION(S): ALASKA'S ENERGY AND AIR QUALITY CRISIS

- HEARD

PREVIOUS COMMITTEE ACTION

No previous action to record

WITNESS REGISTER

MEERA KOHLER, President and CEO
Alaska Village Electric Cooperative Inc. (AVEC)
Anchorage, Alaska
POSITION STATEMENT: Provided a PowerPoint presentation on the All Alaska Energy Solution.

ROBERT JACOBSEN, Ph.D
Vice President Science & Technology
Marsh Creek LLC

McLean, Virginia
POSITION STATEMENT: Answered a question during the presentation on the All Alaska Energy Solution.

REPRESENTATIVE TAMMIE WILSON
Alaska State Legislature
Juneau, Alaska
POSITION STATEMENT: Provided introductory remarks prior to the presentation by the Alaska Resource Agency.

WARD SATTLER, President
Alaska Resource Agency (ARA)
Fairbanks, Alaska
POSITION STATEMENT: Provided a PowerPoint presentation entitled, "Sustainable Renewable Resource Solutions for Interior Alaska's Energy & Air Quality Crisis."

JAMES HOUCK, Ph.D
Independent Consultant; Professor Air Quality
University of Portland
Portland, Oregon
POSITION STATEMENT: Provided a PowerPoint presentation entitled, "Wood Heater Change Outs - A Reality Check."

ACTION NARRATIVE

8:05:22 AM

CO-CHAIR CHARISSE MILLETT called the House Special Committee on Energy meeting to order at 8:05 a.m. Representatives Foster, Higgins, Hughes, Isaacson, Nageak, and Millett were present at the call to order.

PRESENTATION(s): THE ALL ALASKA ENERGY SOLUTION

8:06:29 AM

CO-CHAIR MILLETT announced that the first order of business would be a presentation on the All Alaska Energy Solution by Meera Kohler.

8:06:36 AM

MEERA KOHLER, President and CEO, Alaska Village Electric Cooperative Inc. (AVEC), informed the committee AVEC is a nonprofit electric utility that serves 55 villages primarily in Western Alaska. Since its inception in 1968, AVEC has been

searching for solutions for rural Alaska, and the presentation is about a solution that addresses all of Alaska's energy needs. Ms. Kohler recalled the genesis for this project came from a study group formed by [Commonwealth North, Anchorage, Alaska] that looked at the challenges to a sustainable energy future, specifically for rural Alaska. She pointed out that Alaska's rural communities and the Interior pay the highest energy prices in the nation even though Alaska is an energy-producing state. The average cost of AVEC's delivered fuel cost has increased from $1.29 in 2002 to $4.03 in 2012, which is an increase of 311 percent [slide 3]. The real challenge for Alaska is the cost of heating a home. The study group's first finding is that Alaska needs a statewide energy vision, plan, and pathway to completion [slide 4]. The second finding is that Alaska needs to develop grids because that would enable economies of scale, efficiencies of generation, reduce redundancies in infrastructure, and integrate alternative energy projects [slide 5]. The third finding is that the dependency on diesel fuel must be reduced [slide 6]. The fourth finding is that a single statewide entity could coordinate energy generation and transmission issues for the entire state [slide 7]. The fifth finding is to ensure high-value investments and to provide a "one stop shop" for permitting and regulators [slide 8]. The final finding is to eliminate the need for Power Cost Equalization (PCE) [slide 9].

8:10:58 AM

MS. KOHLER estimated that $3 billion per year is spent on energy. Over 20 years, the total is $60 billion, which would pay for very significant improvements in the cost of energy [slide 10]. Alaska's energy problem is: rural communities use diesel for almost all of their energy needs; Fairbanks uses diesel, wood, and coal for a portion of its electrical generation and heating, contributing to its air quality problem; Southcentral is running out of gas and faces an imminent crisis; and industry is languishing without affordable energy; and energy is scarce and expensive [slide 11]. On the other hand, Alaska has 235 trillion cubic feet (tcf) of stranded natural gas on the North Slope, and with the market price of natural gas decreased throughout the world it makes sense to use that gas to benefit Alaskans [slide 12]. The proposed solution is as follows: very large scale generation of natural gas on the North Slope and high voltage direct current (HVDC) lines forming a backbone transmission grid around the state. With this concept there would be abundant power for North Slope operations, Fairbanks and other Railbelt communities, remote mines, processors, and heat and electricity for rural

communities [slide 13]. Ms. Kohler explained that HVDC is a technology not used in Alaska, but that is used everywhere else in the world. It has been used since the 1950s and has advanced today to cost-effectively transmit very large loads of power long and short distances [slide 14]. For example, for the Three Gorges project in China it would take five high voltage alternating current (HVAC) towers with three wires each to move 6.0 gigawatts (GW) of power, but only two HVDC towers with two wires each. Other advantages of HVDC are that the power moves independently on each line, a smaller right of way is required, and there a big difference in capacity [slide 15]. The Pacific Intertie has been in operation since 1985 and is a 3.0 GW HVDC line connecting California to Washington State that moves power south in summer and north in winter. Furthermore, in 2010 a 1,300 mile HVDC line was installed in China that moves 6.4 GW of power [slide 16].

8:17:56 AM

CO-CHAIR MILLETT asked how much power is lost over long distances.

MS. KOHLER responded that power losses are equivalent to those of a gas pipeline, and there are no reactive problems. In further response to Co-Chair Millett, she said any transmission grid, whether alternating current (AC) or direct current (DC), allows for the admission of renewables.

REPRESENTATIVE FOSTER asked whether renewables would be competitive against natural gas.

MS. KOHLER advised renewables will always be needed because they are emissions free and are cost effective on a large scale.

REPRESENTATIVE NAGEAK asked if transmission grids in California follow highways or cross remote areas.

MS. KOHLER assumed the Lower 48 does not have access issues; however, remote construction of large-scale HVDC is common in Canada.

8:22:18 AM

ROBERT JACOBSEN, Ph.D, Vice President Science & Technology, Marsh Creek LLC, added that Canada has multiple lines 500 or 600 miles across tundra and geography similar to Alaska, and with similar winter conditions. The remote systems are reliable and

are designed so that any necessary maintenance is done by helicopters.

REPRESENTATIVE HIGGINS heard HVDC has a 3 percent to 5 percent line loss per 1,000 miles. He asked how much gas the proposed plant would use and how long it would be viable.

MS. KOHLER estimated the life of a large scale gas generator is about 15-20 years and overhauls extend that estimate. There are existing gas plants in the Lower 48 that are several decades old. In response to Representative Hughes, she said HVDC transmission was not used much in the 1950s because it was more expensive to convert the power from AC to DC. Advances in microprocessor technology have made this process more economic. In further response to Representative Hughes, she said the cost of a DC substation is still higher; however, the key issue with HVDC is the capability to move large amounts of power long distances.

8:29:12 AM

CO-CHAIR ISAACSON asked whether an underutilized HVDC line is efficient.

MS. KOHLER acknowledged this is a "chicken and the egg [situation]" in that the demand load does not exist because of the lack of affordable energy. She expressed disappointment that the [Donlin Gold LLC] project is planning to import liquefied natural gas (LNG) from British Columbia for 360 MW of power over the next 10 years. These potential base loads, such as those in the NANA Region, the Ambler mining district, and others, will not develop until there is available affordable energy, nor will value-added industry and its accompanying jobs.

CO-CHAIR ISAACSON asked whether the state can justify spending money to supply large loads of power without established partnerships with - and commitments from - industry.

MS. KOHLER said the state must build for the future as did the telephone industry. The advantage of building HVDC is that cost does not increase dramatically to build a 2+ GW capacity line. In addition, the generation plants are modular and can always be expanded when necessary. An economic analysis will show the existing load statewide at this time is 6.5 billion kilowatt hours (kWh) per year; however, she characterized this as a "phantom load" that is not an accurate reflection of the true

load, therefore, the project is attractive to industry and will be built mostly by electric utilities.

CO-CHAIR ISAACSON asked whether more line loss occurs if the line capacity is beyond what is needed.

8:35:22 AM

DR. JACOBSEN responded that line loss drops to about 10 percent of what the line is rated. In further response to Representative Isaacson, he said a smaller load is used efficiently and effectively.

CO-CHAIR MILLETT clarified that this project is not in competition with a gas pipeline.

8:37:07 AM

MS. KOHLER provided examples of the use of HVDC technology. The Norway Offshore HVDC Light Project transmits 78 MW of power 182 miles via a submersible cable [slide 17]. An undersea HVDC cable between Estonia and Finland provides a successful connection [slide 18]. She advised that large scale 300 MW to 450 MW generators are high efficiency and would handle aggregated loads for Alaska. Also, the cost of installation decreases as the size of the generator increases [slide 19]. The first part of the project proposes a line from a 1.0 GW generation station at the North Slope through the Railbelt and to Anchorage via a 2.0 GW transmission line [slide 20]. The cost of the power plant is estimated at $1.25 billion, the cost of the power line is estimated at $1.86 billion, and the cost of the converter stations is estimated at $600 million. It is assumed the system will operate at [85] percent capacity for 30 years at 7 percent. This results in a wholesale delivered cost of power of about $0.09 per kWh. She pointed out that more than half of the cost is the capital cost of the line [slide 21]. When comparing the cost of using electricity for heat, at $5 per gallon, diesel used in an 80 percent efficient furnace costs the equivalent of $0.163 per kWh. A 2.5 GW gas-fired power plant on the North Slope could deliver an equal amount of energy for $0.065 per kWh [slide 22]. Another proposal was for a 500-mile transmission line to Fairbanks that with a capital cost investment of $4 billion, results in an estimated cost of $0.65 per kWh [slides 23 and 24]. Extending the line west 600 miles to the NANA and Norton Sound regions is estimated to cost an additional $1 billion for a 200 MW line. The delivered power

would cost about $0.15 per kWh, and a reduction in cost is expected with increased demand on the line [slides 25-27].

8:42:05 AM

MS. KOHLER concluded that HVDC is as reliable as AC, although the proposal does not exclude gas generation stations located around the state where practical [slide 28]. The proposal would make a significant step to reduce greenhouse gases and emissions, thereby reducing emissions by high percentages [slide 29]. On the critical question of whether the project competes with a gas pipeline, she indicated that the 2.5 GW project would use 113 billion cubic feet of natural gas per year thus in a 30-year life cycle would use 3.4 tcf of gas, which is 1.5 percent of the total known reserves of gas on the North Slope [slide 30]. In summary, HVDC transmission can be used to interconnect the state to deliver low-cost power to industry, the military, processors, residents, and community buildings. It can further eliminate PCE, reduce greenhouse gas emissions, and provide for value-added products made in Alaska [slide 31].

8:44:22 AM

REPRESENTATIVE HUGHES asked Ms. Kohler for her first recommendation for action by the committee.

MS. KOHLER suggested that the committee focus on how to actualize the state's energy policy in a way that is achievable in the foreseeable future. The proposed project could be built in five years; the generation is "out of the box" technology and the expertise to build the transmission lines is available locally. Although construction of the converter stations would take outside means, there are international firms familiar with this specific project.

REPRESENTATIVE HUGHES asked whether a single statewide entity is necessary to develop a solution.

8:46:18 AM

MS. KOHLER suggested there should be a study of the concept used in the Lower 48, which is that the utilities typically do not generate power, but purchase power from the grid as members and owners of a generation and transmission (G&T) organization. Thus, individual utilities do not develop their own local grids in isolation, but as members of a large organization. For example, in Alaska the Alaska Industrial Development and Export

Authority (AIDEA), Department of Commerce, Community & Economic Development, could serve this purpose.

8:47:41 AM

REPRESENTATIVE FOSTER asked Ms. Kohler to address access to land.

MS. KOHLER said this is an issue that needs to be addressed in partnership with the state. The proposed project should be appealing to the federal government; however, the routes will be studied with the possibility of burying cable underground if necessary.

REPRESENTATIVE FOSTER said as a rural legislator, he would like to not rely on PCE because that would be good for the state overall, and because PCE is susceptible to economics.

MS. KOHLER agreed that cuts to the PCE program have been painful for rural residents. As an aside, she noted that the Alaska Housing Finance Corporation (AHFC), Department of Revenue, reported that the state spends $640 million per year to power state buildings.

8:52:30 AM

REPRESENTATIVE NAGEAK asked whether this project would eliminate some other energy projects.

MS. KOHLER assumed the construction of the [Susitna-Watana Hydro project] which would be an alternative generation source distanced from the North Slope. She pointed out that the HVDC transmission lines proposed by this project can be used to transmit hydropower to market, and for other sources as well. Furthermore, as resources are identified across the state, markets will be spread further apart.

REPRESENTATIVE HUGHES asked whether private industry has expressed interest in this project.

MS. KOHLER said yes.

REPRESENTATIVE HIGGINS recalled past conversions from all-electric homes because of fluctuating prices. He expressed concern about gas as the state's main source of energy because the oil and gas industry control the price.

MS. KOHLER stated the intent at the outset is to have long-term contracts for gas. Gas is a commodity subject to supply and demand and because of the plentiful supply of gas the price will be low for a long time.

8:57:52 AM

The committee took an at-ease from 8:57 a.m. to 9:04 a.m.

9:04:09 AM

PRESENTATION(s): ALASKA'S ENERGY AND AIR QUALITY CRISIS

9:04:20 AM

CO-CHAIR MILLETT announced that the next order of business would be a presentation on Alaska's Energy and Air Quality Crisis by the Alaska Resource Agency.

9:04:32 AM

REPRESENTATIVE TAMMIE WILSON, Alaska State Legislature, informed the committee that Fairbanks is currently a U.S. Environmental Protection Agency (EPA) fine particle (PM 2.5) nonattainment area for particulate matter from wood smoke and other pollutants. This status creates barriers to the growth of the area and, in response, the community has established wood stove change out programs and installed pollution-control devices. The presentation will discuss other efforts to reach the community's goal for cleaner air; however, without natural gas the EPA limits cannot be reached - even though replacing wood and coal heating systems with cleaner units is beneficial.

9:06:12 AM

WARD SATTLER, President, Alaska Resource Agency (ARA), gave a short history of his experiences in Alaska. He said air quality is a serious problem in Fairbanks and North Pole although it was worse in the '60s and '70s. At that time air pollution was caused by automobile exhaust, and the problem was moderated by EPA mandates requiring catalytic converters on cars. Now the cause of poor air quality is that the price of energy is high and residents have returned to wood stove use for home heating. Mr. Sattler explained how carbon particles and highly injurious chemical compounds bond with water vapor when there is an inversion layer in cold weather. Nothing can be done about the inversion layer, but new technology has led to wood stoves that

do not produce troublesome particulates and today's outdoor wood-fired boilers burn cleaner. The goal of ARA is to advance sustainable and renewable resource solutions for Interior Alaska [slide 2]. Large-scale energy projects to reduce the cost of energy have been proposed, but completion remains over a decade away, and innovative, cost-effective solutions are needed now for clean heat and power to improve the quality of life and emphasize the use of Alaska's vast renewable biomass resources. He provided an inventory of residential heating devices indicating that inefficient and antiquated appliances have led to serious air quality problems [slide 3].

9:14:24 AM

CO-CHAIR MILLETT asked whether EPA shut down two outdoor wood boilers recently.

MR. SATTLER said that is a legal question. He returned to the presentation and pointed out that wood-burning stoves give the Fairbanks area some of the worst pollution in the U.S. He restated that large energy projects are years away from completion, including the expansion of the Fairbanks North Star Borough Gas Distribution System.

CO-CHAIR ISAACSON surmised building a gas pipeline would take until 2021, but not the gas trucking project.

MR. SATTLER was unsure how fast the trucking project would develop. While the Interior waits for gas the future is jeopardized for Eielson Air Force Base, Army Post Fort Wainwright, federal transportation funds, businesses, the housing market, and public health. He suggested the cost-effective solution is a new infrastructure for biomass utilization [slide 7]. Alaska Resource Agency has addressed the interim energy and air quality problem by administering field and research and development projects such as the Air Quality Attainment (AQA) project, which seeks to identify pollution sources in sensitive areas, inform homeowners of possible upgrades to appliances, perform upgrades, teach homeowners best burn practices, and replace uncertified or defective wood stoves. Since September 2012, ARA has inspected and maintained appliances, installed appliances, inspected outdoor wood boilers, installed pollution control devices, and replaced five large outdoor wood boilers [slide 8].

9:19:11 AM

REPRESENTATIVE NAGEAK asked how the recent accomplishments were financed.

MR. SATTLER answered the AQA program was paid for by a state grant.

9:20:02 AM

JAMES HOUCK, Ph.D, informed the committee he is an independent consultant on energy and environmental issues and an adjunct professor at the University of Portland in air quality. He provided a PowerPoint presentation entitled, "Wood Heater Change Outs - A Reality Check." Dr. Houck said the most important benefit of a "change out" to a new wood heating system is to improve health. Secondly, change outs will contribute to the goal of attainment of federal fine particulate standards. Also, modern appliances produce less creosote, which is associated with chimney fires, and are safer and more efficient units [slide 1]. In fact, EPA has certified many cordwood stoves and inserts. In response to Representative Nageak, he confirmed that cordwood is the fuel under discussion.

9:23:56 AM

DR. HOUCK further advised that there are also wood stoves that are designed to fit into the cavities of existing fireplaces and that are certified by EPA. A listing of all EPA-certified appliances is available on its web site, Burn Wise. For outdoor boilers - also known as hydronic heaters - EPA developed a voluntary program and the results of tested values are available online [slide 2]. All pellet stoves, inserts, and furnaces, are clean burning when compared with wood burning devices. In addition, there are EPA qualified fireplaces. Masonry heaters are all clean burning but are very expensive. Dr. Houck estimated that there are 28 million existing fireplaces which could be improved with retrofit appliances [slide 3]. A chart compiled of a variety of national phone surveys taken from 1987 to 2010, indicated that 35 percent of wood heaters are currently certified [slide 4]. Returning to the issue of health, he explained that pollutants from wood combustion are products of incomplete combustion: carbon monoxide; respirable particles; and volatile organic compounds (VOC) that are toxic and carcinogenic [slide 5]. Residential wood combustion also causes a higher exposure to humans than manufacturing because chimneys are not very high, and this concentration is dangerous to the very young and the very old, as is exposure indoors in residential settings [slides 6 and 7]. Dr. Houck directed

attention to a diagram of the origin of air emissions, explaining that burning 1 kilogram (kg) of wood requires 7.3 kg of air which is expelled as air emissions and ash [slide 8]. Air emissions from complete combustion consist of water and carbon dioxide. Air emissions from incomplete combustion consist of carbon monoxide, VOCs, and particles [slide 9].

9:37:07 AM

DR. HOUCK then provided a list of Conventional Uncertified Wood Heater Title III Hazardous Air Pollutants [slide 11]. Replacing an uncertified stove with a non-catalytic certified stove provides a reduction in emissions of about 68 percent in particles; however, when the savings in fuel is factored in, the reduction in emissions becomes 71 percent [slide 12]. Furthermore, certified wood stoves have continued to improve in efficiency by 19.6 percent, and outdoor wood boilers too have improved dramatically [slides 13 and 14]. Returning to the problems in Fairbanks, he said Fairbanks is a federal nonattainment area for fine particles under two standards: 24-hour standard of 35 micrograms per cubic meter or annual standard of 12 micrograms per cubic meter [slide 15]. He provided a map of the nonattainment area, pointing out that many monitors are needed for an accurate reading [slide 16].

9:41:45 AM

CO-CHAIR MILLETT asked how many monitors are posted in the area.

REPRESENTATIVE T. WILSON gave the location of monitors in the Fairbanks and North Pole areas, and said there is a mobile monitor that reports existing conditions to a web site.

DR. HOUCK opined the real health issue in Fairbanks is not due to the annual standard of exposure, but of episodic exposure; in fact, about 30 episodes occurred during the winter of 2009-2010 where the air quality exceeded the 24-hour standard. Acute exposure causes asthma attacks and other health emergencies.

CO-CHAIR ISAACSON surmised that if fuel costs were low residents would not burn wood, and that would improve the air quality.

DR. HOUCK stressed the influence of meteorology, temperature, and growth.

CO-CHAIR ISAACSON, as a resident, has witnessed an increase in the use of wood heating systems.

9:45:45 AM

DR. HOUCK provided a summary of statistics for the Fairbanks State Office Building that indicated the annual design value was met in 2009 by a small margin [slide 18]. He opined wood heater change outs will reduce the frequency of 24-hour standard noncompliance, will help the annual standard, and may help with the carbon monoxide maintenance area in downtown Fairbanks [slide 19]. Dr. Houck directed attention to cost savings due to increased efficiency, and presented an example of a change from five cords of wood burned in an uncertified stove, which saved at least $283 per year when replaced with a certified stove, and at least $344 per year when replaced with a certified catalytic stove [slide 21]. Between 2005 and 2008, a successful community change out took place in Libby, Montana, which has some weather and geographic similarities to Fairbanks [slides 22-24]. The change out happened during three heating seasons and about 1,100 stoves were replaced [slide 25]. A summary showed that in 2004-2005 there were six instances of 24-hour noncompliance in Libby, in 2007-2008 there was one, and after four years there were none [slides 26]. In response to Co-Chair Isaacson, he said continued study for five years leveled the meteorological effects [slide 27].

DR. HOUCK, turning to economics, said an economic advantage of heating with wood is that many people cut their own firewood [slide 28]. Finally, he compared three households using approximately 115 million British thermal units (Btu) during one heating season. The cost of heating by electricity was $7,415, by fuel oil was $3,316, and by an outdoor wood boiler system was $1,375 [slide 29].

REPRESENTATIVE T. WILSON pointed out action is necessary for Fairbanks now because the area has been given deadlines by EPA. In a plan required by EPA, Fairbanks has cited pollution control devices and change outs to reduce air pollution, but Fairbanks and surrounding areas need a different source of energy, and gas is better for air quality and price.

REPRESENTATIVE FOSTER asked for the consequence of not meeting federal requirements.

REPRESENTATIVE T. WILSON understood the Fairbanks North Star Borough could lose federal highway transportation funding.

REPRESENTATIVE HUGHES asked whether health data is indicative.

REPRESENTATIVE T. WILSON said health data will be provided. She reminded the committee that residents are not "burning poorly."

9:58:01 AM

REPRESENTATIVE HIGGINS asked what the changes were in Montana.

DR. HOUCK explained that wood burning was only allowed in certified devices or pellet stoves in the City of Libby or in Lincoln County, Montana. Most changes were from an uncertified wood stove to a certified wood stove.

REPRESENTATIVE T. WILSON advised that the City of Libby provided and installed the stoves.

9:59:46 AM

ADJOURNMENT

There being no further business before the committee, the House Special Committee on Energy meeting was adjourned at 9:59 a.m.